

TWELVE NEW DICOTS FROM BAJA CALIFORNIA, MEXICO

REID MORAN

ABSTRACT. — Described are *Hedeoma martirensis*, *Heterotheca martirensis*, *Stephanomeria monocephala*, and *Tanacetum bajacalifornicum*, from the high east face of the Sierra San Pedro Mártir; *Eriogonum zapatoense* and *Castilleja fruticosa*, from Isla Guadalupe; *Eriogonum angelense*, from Isla Angel de la Guarda; *Dudleya nubigena* (Brandegee) Britt. & Rose ssp. *cerralvensis*, from Isla Cerralvo; *Hemizonia greeneana* Rose ssp. *peninsularis*, from Islas de Todos Santos and the nearby coast; *Monardella lagunensis* M. E. Jones ssp. *mediopeninsularis*, from four peaks in central Baja California; *Rhus kearneyi* Barkley ssp. *borjaensis*, from the Sierra San Borja; and *Rhus kearneyi* ssp. *virginum*, from the mountains of south central Baja California.

RESUMEN. — Se describen doce taxa nuevos de Dicotiledóneas procedentes de Baja California, Mexico: *Hedeoma martirensis*, *Heterotheca martirensis*, *Stephanomeria monocephala*, y *Tanacetum bajacalifornicum*, de la alta escarpadura oriental de la Sierra de San Pedro Mártir; *Eriogonum zapatoense* y *Castilleja fruticosa*, de la Isla Guadalupe; *Eriogonum angelense*, de la Isla Angel de la Guarda; *Dudleya nubigena* (Brandegee) Britt. y Rose ssp. *cerralvensis*, de la Isla Cerralvo; *Hemizonia greeneana* Rose ssp. *peninsularis*, de las Islas de Todos Santos y costas cercanas; *Monardella lagunensis* M. E. Jones ssp. *mediopeninsularis*, de cuatro cerros de la parte central de Baja California; *Rhus kearneyi* Barkley ssp. *borjaensis*, de la Sierra San Borja; y *Rhus kearneyi* ssp. *virginum*, de las sierras centro-meridionales de Baja California.

In the course of general collecting in Baja California, I have found several previously unknown plants, twelve of which are described here. In the citation of collections, field numbers are mine unless otherwise identified. Each of my recent collections (above number 5000) is represented in the herbarium of the San Diego Society of Natural History. Duplicates now being distributed are mostly not cited; they will go to the herbaria of the Smithsonian Institution, in Washington, the Universidad Nacional Autónoma de México, in Mexico City, the University of California at Berkeley, and various other institutions.

Eriogonum angelense Moran, spec. nov. (Fig. 1)

Planta perennis, caudice pauciramoso, erecto, 1-6 dm alto, rosula densa 2-3 1/2 dm lata coronato. Folia hirtella, 3/4-2 dm longa, lamina ovata, cordata, apice rotundata, petiolo subaequilonga. Pedunculus nudus, 2 1/2-7 1/2 dm altus, 2-3-chotomus, ramis 3-12 dm altis, racemos 2-13 cm longos racemose ferentibus. Involuta solitaria, brevipedunculata, turbinata, 5-lobata, 2-2 1/2 mm alta, extus glabra, bracteolas multas lineari-oblancheolatas glandulosas continens. Flores ca. 50-120, glabri, flavi, ca. 1.6 mm longi, segmentis oblongo-ovatis, interioribus angustioribus. Typus: Moran 10454 (SD 54186). Ab aliis subgeneris Ganysmae magnitudine, inflorescentiae forma, copiaque florum involucri differt.

Plant perennial, the caudex erect, simple or few branched above, 1-2 (-6) dm tall, 8-20 mm thick, covered above with old dried leaves, reddish brown below with persistent leaf bases, in sterile condition crowned with a rosette 2-3 1/2 dm wide of ca. 30 close-set leaves. Leaves green, hirtellous, the trichomes colorless, 0.3-1.2 mm long; blades ovate, rounded at apex, mostly cordate at base, 5-11 1/2 cm long, 3-9 cm wide, with 4-6 rather



Figure 1. Herbarium specimens of *Eriogonum angelense* (10421), from Isla Angel de la Guarda, showing sterile rosette and old floral stem, x 0.23.

prominent ascending veins on each side, the margins irregular and slightly crisped; petioles 4-11 cm long, 2-4 mm wide at apex, widening to 1-2 cm at the clasping base, distinctly ca.-9-nerved below. Flowering rosettes elongating to $\frac{1}{2}$ -1 dm, the floral stem terminal, erect, glabrous, 5-18 dm tall, once dichotomous or often also with a smaller third branch, the first internode $2\frac{1}{2}$ - $7\frac{1}{2}$ dm tall, 6-11 mm thick, each branch with its first internode $\frac{1}{2}$ -2 dm long and succeeding ones gradually shorter, each node with one branchlet, the branchlets ascending, mostly simple, 2-13 cm long (the upper shorter), with 4-12 nodes. Bracts in threes, shortly connate, oblong, subacute, pubescent especially ventrally and on margins, the lowest to 15 mm long, those of branchlets ca. 1 mm long. Involucres solitary, on peduncles 1-2 (-4) mm long, turbinate, glabrous without, pubescent within, 2- $2\frac{1}{2}$ mm high, 5-lobed for one-third their length with rounded lobes, containing numerous linear-oblongolate glandular-puberulent bractlets $1\frac{1}{2}$ -2 mm long. Pedicels glabrous, $1\frac{1}{2}$ -2 $\frac{1}{2}$ mm long. Flowers ca. 50-120, glabrous throughout. Perianth yellow, 1.6-1.7 mm long, the segments oblong-ovate, subtruncate, ca. 1.2 mm long, the outer 0.7-0.8 mm wide, the inner 0.5-0.6 mm wide. Filaments white, ca. 0.5 mm long; anthers light yellow, oblong, ca. 0.4 mm long. Ovary yellowish, ca. 0.5 mm long. Achenes not seen.

Type collection.—Occasional on south side of canyon at about 550 meters elevation, west slope of peak about 4 miles southeast of Puerto Refugio, Isla Angel de la Guarda, Baja California, Mexico (near $29^{\circ}29\frac{1}{2}'N$, $113^{\circ}33'W$), 22 March 1963, *Moran*

10454 — holotype: SD 54186; isotypes: DS, MEXU.

Distribution. — Known only from Isla Angel de la Guarda at 350 to 800 meters: rather scarce, in small colonies on ridges and canyonsides or less often in arroyo beds. Other collections: a dozen plants on N and W slopes on insular divide ca. 2 miles SE of Puerto Refugio, 500 m, 10421 (SD, UC, US); few in arroyo bed NW of Cerro Angel, 500 m, 12935 (SD); scarce on rocky slopes and in arroyo bed NW of Cerro Diablo, 350 m, 12456 (CAS, SD); half dozen plants on W slope SW of Cerro Diablo, 630 m, 12446 (SD).

Discussion. — At the type locality in March 1963, a few plants were preparing to flower, but only the very first flowers on one plant were open. At the other places where I saw the plant on that trip and in early March and late April 1966, none were flowering or preparing to flower. At each of the five places, however, old floral stems with involucre still remained.

Eriogonum angelense belongs to the subgenus *Ganysma*, most species of which are annuals and much smaller. It appears to differ from all previously known species in its generally larger size, its open inflorescence whose two or three main branches are essentially racemes of racemes, and its more numerous flowers per involucre. It is perhaps most closely related to *E. inflatum* Torr. & Frem., native from Utah to central Baja California; but it differs further in its almost palmlike habit, its somewhat larger and non-glandular involucre on shorter peduncles, and its smaller and glabrous perianth. *Eriogonum inflatum* var. *deflatum* I. M. Jtn. occurs on Isla Angel de la Guarda but apparently only near the shore and not with *E. angelense*.

Exploration of the peninsula of Baja California has reduced the list — never long — of plants known only from islands off its eastern shore, and these islands appear to have few endemics. Isla Angel de la Guarda, with four still listed, apparently has more than any other. Besides *Eriogonum angelense*, these are *Ferocactus johnstonianus* Britt. & Rose, *Penstemon clevelandii* ssp. *angelicus* (I. M. Jtn.) Keck, and *Hofmeisteria filifolia* I. M. Jtn. *Lyrocarpa linearifolia* Rollins is known only from Islas Angel de la Guarda and San Esteban.

***Eriogonum zapatoense* Moran, spec. nov. (Figs. 2, 8)**

Frutex decumbens 1-4 (-7) dm altus, ad 2½ m latus, trunco basi ad 1 dm diam. Folia dense tomentosa, lamina crassa, oblonga, rotundata, 3-6 cm longa, 1-2½ cm lata, in petiolum 1-3 cm longum et 1½-2 mm latum gradatim angustata. Pedunculi 3-13 cm alti, inflorescentia cymosa, ½-2½ dm lata, axe 4-8-plo trifurcato. Involucre solitaria, subsessilia infernave pedunculata, campanulata, 2½-4 mm longa, 1½-3 mm lata, ca. 10-40-florata, extus tomentosa, intus subglabra, dentibus 5, deltoideis, obtusis, ½ mm longis. Pedicelli glabri. Perianthium flavum, 2½-3 mm longum, intus glabrum, extus basi hirtellum, segmentis obovatis, interioribus exteriora excedentibus. Typus: Moran 15114 (SD 67852). Ab *E. giganteo* atque *E. molli* habitu decumbenti staturaque minore, foliis crassioribus, pedicellis glabris, et perianthio flavo recedit.

Shrub commonly prostrate, 1-4 or rarely 7 dm high, ½-2½ m wide, the herbage densely tomentose, the tomentum at first white and with a few spreading hairs to ½ mm long, at maturity gray and close. Trunk rarely 10 cm thick at base; branches commonly decumbent, to 2 m long and 3 cm thick, zigzag, often bare except at summit, reddish brown beneath shaggy brown outer bark. Branchlets 3-6 mm thick, covered and concealed by persistent sheathing-decurrent leafbases, each with 5-15 leaves in the upper 2-3 cm. Leaves tomentose, the blades thick, oblong, obtuse to mostly rounded at apex, 3-6 cm long, 1-2½ cm wide, conspicuously reticulate dorsally with projecting veins and venules, glabrate ventrally at post maturity and exposing a surface which in the dried leaf is often orange-brown to dark red,

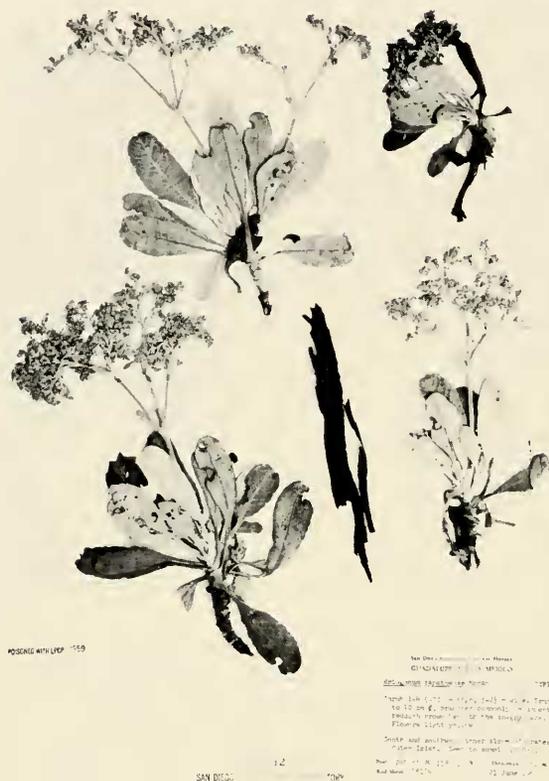


Figure 2. Type specimen of *Eriogonum zapatoense* (15114), from Isote Zapato, Isla Guadalupe, x 0.25.

gradually narrowed below into a petiole ca. 1-3 cm long and 1 ½-2 mm wide, the base an obconic sheath oblique at top. Floral stem plus inflorescence ½-2 ½ dm high, the peduncle of one internode 3-13 cm tall, 2-3 mm thick, terminal, growth later continuing sympodially. Inflorescence cymose, ½-2 ½ dm wide, imperfectly 4-8 times trichotomous, some lower trichotomies about equal but the upper with branches unequal or some suppressed, each fork with a terminal involucre, or the lower sometimes with a terminal axis bearing 1-2 whorls of branches and a terminal involucre. Bracts connate at base, the lowest unequal, oblong to spatulate, 5-25 mm long, 1 ½-6 mm wide, the uppermost equal, triangular-ovate, ca. 1 ½ mm long. Involucres solitary, sessile or the lower on peduncles to 5 mm long, campanulate, 2 ½-4 mm long, 1 ½-3 mm wide, glabrous within, tomentose without, with 5 triangular-obtuse teeth ca. ½ mm long, each involucre with ca. 10-40 flowers. Pedicels 2-3 mm long, glabrous. Perianth yellow, 2 ½-3 mm long, glabrous within, densely hirtellous without at base, the lobes obovate, rounded at apex, glabrous on the broad thin margins, the outer 1.2-1.5 mm long, 1.1-1.3 mm wide, the inner 1.5-1.8 mm long, 0.9-1.0 mm wide. Filaments inserted at top of tube, ca. 1.3-2.0 mm long, bearded at base; anthers 0.5-0.6 mm long. Achenes brown ca. 2.2 mm long and 0.8 mm thick; styles ca. 1.2 mm long; seed dark brown, ca. 1.7 mm long. Gametic chromosome number: $n = 20$.

Type collection. — Rather common on south and southwest inner slopes of the crater at 50 meters elevation, Isote Zapato (Outer Islet), 2 miles south of Isla Guadalupe, Baja California, Mexico (near 28°51'N, 118°17'W), 21 June 1968, *Moran 15114*—holotype: SD 67852; isotypes: K, MEXU, UC, US, etc.

Distribution. — Known only from Islote Zapato at elevations of 50 to 200 meters. Other collections: *Remple* in July 1937 (DS); *Moran 2927*, March 1948 (CAS, DS, SD); *Kuijt, Miller, & Lindsay 1042*, June 1955 (SD, UC); *Lindsay 2623*, June 1955 (DS).

Discussion. — Islote Zapato, two miles south of Isla Guadalupe, is little more than a seabound volcanic crater, whose inner slopes rise uniformly at about 45 degrees to meet the sheer outer seacliffs on three sides in a jagged knife-edge rim of greatly varying height: only to the east does this sharp rim give place to a narrow and almost flat hanging valley some 200 meters above the sea. *Eriogonum zapatoense* is common on the inner slopes of the crater, especially the south slope, and is occasional in the upper valley. In protected places, plants may grow more or less erect, but most are prostrate. Commonly the trunk or the few main branches run up slope, so that the plant is strongly asymmetrical. In many larger plants, the lower branches are dead and the foliage is clustered at the top. The March collection is sterile, the June collections are in flower, and the July collection is in bud. In June 1968 the inflorescences were generally smaller than the many remaining from the year before. Measurements cover the old as well as the new.

Eriogonum zapatoense is most similar to *E. molle* Greene, of Isla Cedros, Baja California, and to *E. giganteum* S. Wats., of Santa Catalina, San Clemente, and Santa Barbara Islands, California. In leaf shape it especially resembles *E. giganteum* ssp. *formosum* (K. Brandege) Raven. Both *E. molle* and *E. giganteum* grow erect (and *E. giganteum* often much taller); and both have somewhat thinner leaves, commonly taller and stouter peduncles, and much larger and, especially in *E. molle*, denser inflorescences, with pubescent pedicels, and with white or pink flowers. My sterile collection of March 1948 was referred to *E. molle* (Moran, 1951).

From buds of the type collection, Dr. James L. Reveal reports a gametic chromosome number of $n = 20$.

Although the new species has been found only on Islote Zapato, for which it is named, it very likely occurs also on precipitous nearby Islote Toro (Inner Islet), where no botanist has been able to collect. It is one of five species of Islote Zapato never found on the main island of Guadalupe, the others being *Erysimum insulare* Greene, *Dudleya guadalupensis* Moran, *Rhus integrifolia* (Nutt.) Rothr., and *Lavatera lindsayi* Moran. *Coreopsis gigantea* (Kell.) Hall, a sixth species of Islote Zapato, was found on the main island in 1875 but has not been seen there since. Presumably all six species have been nearly or quite exterminated on the main island by the goats that have so drastically reduced the native vegetation.

***Dudleya nubigena* (Brandegee) Britton & Rose ssp. *cerralvensis* Moran, subsp. nov.**
(Fig. 3)

A subspecies typica foliis viridibus modiceve glaucis nec farinosis atque corollis flavis nec aurantiis usque rubris sat differt. Typus: Moran 3618 (SD 69717).

Caudex unbranched, erect, rarely 6 cm high, 1-2 ½ cm thick. Rosettes ½-1 (-2?) dm wide, of 15-30 leaves. Rosette leaves green or slightly glaucous, triangular-lanceolate to elliptic-oblong, acute, apiculate, 3-10 (-15) cm long, 12-20 (-35) mm wide, 2-4 (-5 ½) mm thick, flattish or slightly channeled ventrally, convex dorsally, the margins acute near base, obtuse above. Floral stems 1-3 dm tall, 2-4 (-5) mm thick, naked in lower 2 ½-11 cm, with 8-20 leaves above, the leaves ascending, narrowly triangular-ovate, obtusish, ½-1 ½ (-3) cm long. Inflorescence erect from the first, 5-8 cm wide, of 2 or 3 branches which bifurcate 0-2 times but usually once, the cincinni 2-5 cm long, each with 5-14 flowers. Pedicels erect (but often perpendicular to floral stem when that has declined), ca. 1 mm thick below and thicker upwards, the lowermost (6-) 10-15 mm long. Calyx 4-6 mm long, 4-6 (-8) mm wide, subtruncate to rounded below in anthesis, deeply divided, the disk sometimes narrower than

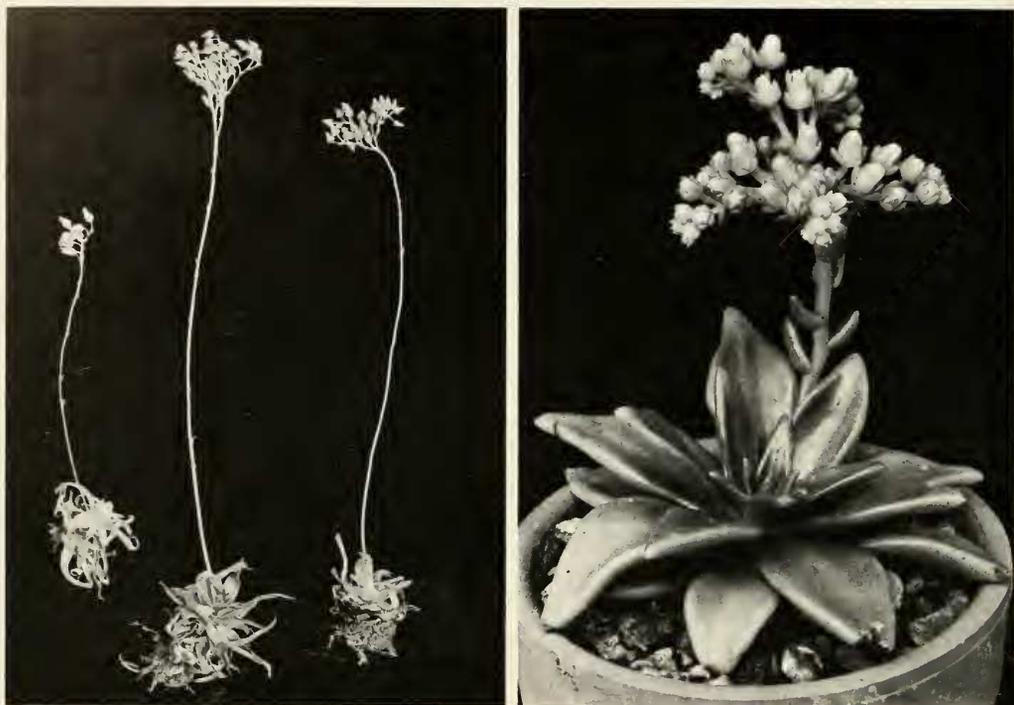


Figure 3. *Dudleya nubigena* ssp. *cerralvensis*. Left: freshly collected plants of the type collection (3618), 4 April 1952, x 0.2. Right: topotype (9542) flowering in San Diego 28 October 1962, x 0.6.

corolla, the segments erect or mostly ascending with tips ca. 1 mm from corolla, triangular-ovate, acute, 2½-5 mm long, 2½-3½ mm wide. Corolla clear yellow, pentagonal, 7½-10 mm long, 4-5 mm thick at base, 3-4 mm wide at apex, the tube 3-5½ mm long, the segments oblong, 1½-2 mm wide, rounded to broadly acute. Filaments light yellow, subulate, the epipetalous 6-7½ mm long, adnate 2-4 mm, the antesealous 6½-8 mm long, adnate 2½-3½ mm; anthers light yellow, 1½-2 mm long. Nectar glands whitish, truncate, ca. ¼ mm high and 1 mm wide. Gynoecium 6-7½ mm high, ca. 3 mm thick, white below, yellowish above, the pistils erect, appressed, the styles ca. 1½ mm long. Ovules 50-80, ca. 0.5 x 0.2 mm. Gametic chromosome number: $n=17$.

Type collection. — Locally common on north-facing granitic cliffs at 120 meters elevation, in the arroyo about 1 mile east of the abandoned Ruffo Ranch, southwest side of Isla Cerralvo, Territorio de Baja California Sur, Mexico (near 24°11'N, 109°51'W), 4 April 1952, *Moran 3618* — holotype: SD 69717; isotypes: BH, DS, UC, US. Some other duplicates may have been distributed by the Bailey Hortorium as *Dudleya* sp.

Distribution. — Known only from the type locality. Other collection: 9542.

Discussion. — To judge from exploration in several parts of the island, this plant is not common, very likely being confined to relatively cool and shaded habitats, which are scarce. In April 1952, most plants were flowering (fig. 3, left); in April 1962, a drier season, I saw no plants flowering and only two with old floral stems apparently of that year.

Plants of the type collection flowered in the greenhouse at Ithaca in November 1952; some from the second collection flowered in San Diego in October 1962 and again, at what

seemed a more normal season, in the springs of 1964 and 1965. A plant of *Dudleya* brought into cultivation may look more different from its former self in the wild than plants of two different species, grown together, sometimes look from each other. The difference between wild and cultivated plants here was striking (fig. 3). The description is based on the freshly collected material and on the cultivated plants. The parenthetic extreme measurements are mostly from the cultivated plants.

Brandegee (1891) based *Cotyledon nubigena* on plants from "the summits of the Sierra de la Laguna"; but in the herbarium he later identified with it plants from San José del Cabo, near sea level. Rose (Britton & Rose, 1903) separated the lowland plants as *D. xantii*, the type specimen from Cabo San Lucas. It appears that his distinctions do not hold but that there may be other slight differences. Until further living material can be studied, however, I would include *D. xantii* in *D. n. nubigena*, to which it is at least very similar. This subspecies then is known from a dozen localities scattered through the Cape region of Baja California, from Isla Espíritu Santo to Cabo San Lucas and from sea level to 1800 meters. It is characterized by farinose leaves and orange to coral red corollas. *Dudleya n. cerralvensis*, in other ways very similar, differs in having green or slightly glaucous leaves and clear yellow corollas.

From cultivated plants of both collections, Dr. Charles H. Uhl reports a gametic chromosome number of $n=17$ for *D. n. cerralvensis*. He has found the same number in one montane and several lowland collections of *D. n. nubigena*.

Rhus kearneyi Barkley (Fig. 4)

Rhus kearneyi has been known only from the Tinajas Altas Mountains of southwestern Arizona, where according to Kearney and Peebles (1951) it occurs at 1000 to 1500 feet elevation. It was at first confused with *R. integrifolia* (Nutt.) Rothr., of coastal southern California and northern Baja California. In typical *R. kearneyi*, the puberulence of twigs and bracts is sparser than in *R. integrifolia* and not closely appressed, the leaves are cordate or subcordate at the base and perhaps a little thinner, the cilia of the sepals are non-glandular, and the petals are non-ciliate. The twigs, bracts, and leaves, especially the under surfaces, bear short thick glands about 0.05 mm long, which turn orange-red and may persist as detached or easily detachable granules, resembling frass. The leaves, described as glabrous except for the glandular hairs, in fact are sparsely puberulent; and the tiny trichomes, if not always erect, at least are not closely appressed like the few sometimes found on the leaf blades of *R. integrifolia*.

My collections from Baja California include one from the east base of the Sierra San Pedro Mártir that seems referable to typical *R. kearneyi* and several from the mountains farther south that seem to represent two new subspecies of *R. kearneyi*.

For reasons that he did not state, Barkley (1937) considered *R. kearneyi* most closely related to *R. standleyi* Barkley, of southeastern Mexico, and to *R. ovata* S. Wats., of Arizona, southern California, and northern and central Baja California. In Arizona, according to Kearney and Peebles, *R. ovata* occurs at 3000 to 5000 feet and thus much higher than *R. kearneyi*. Both the new subspecies of *R. kearneyi* occur at higher elevations than the typical subspecies, and both occur with *R. ovata*.

Rhus kearneyi ssp. *kearneyi*

Teledo Cañon, E side of Sierra San Pedro Mártir, 700 m, 7550 (DS, ICF, SD, UC). Collected in October, the specimen has only young inflorescences; but the petals in bud are seen to be non-ciliate. This was distributed as *R. integrifolia*.

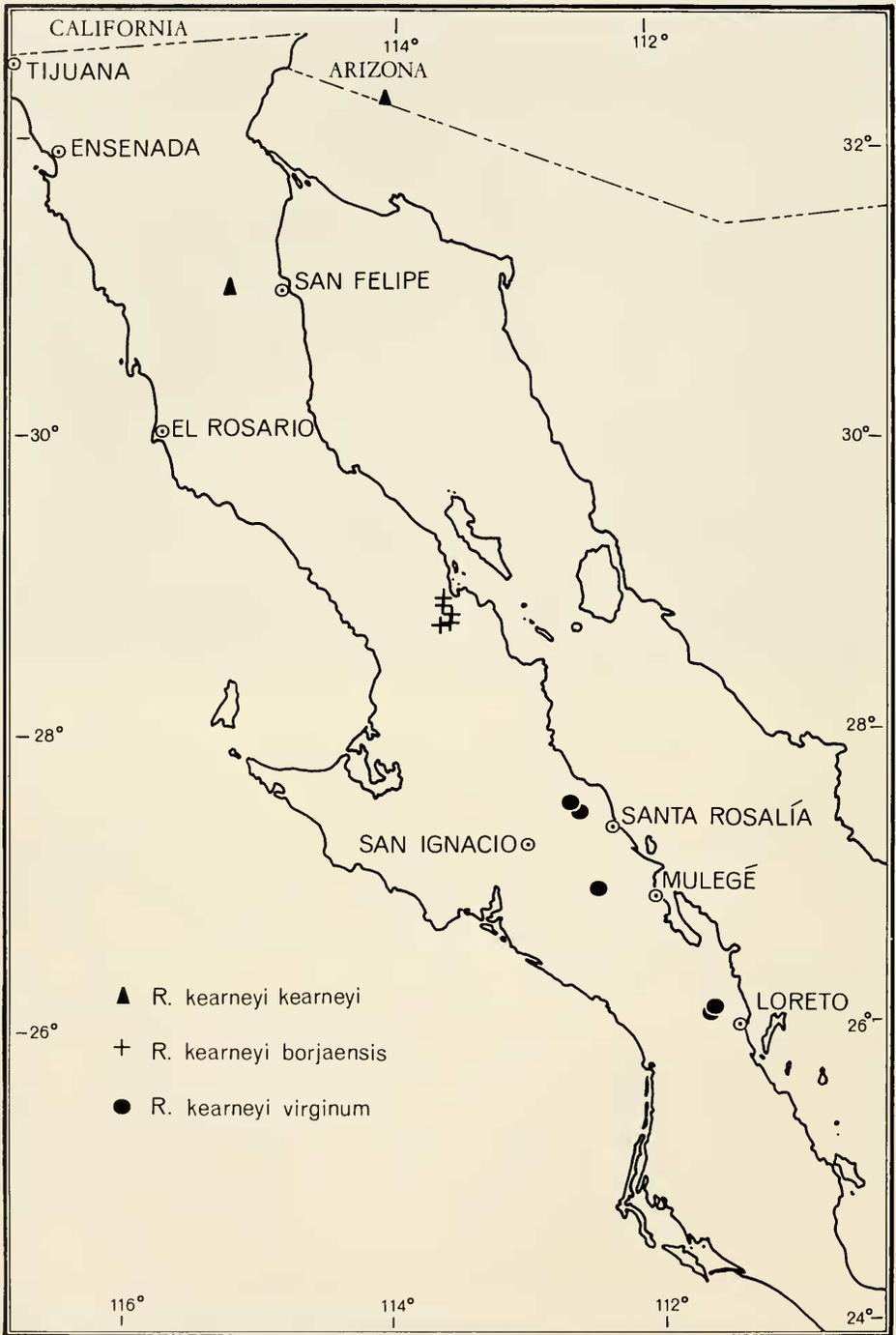


Figure 4. Distribution of *Rhus kearneyi*.

Rhus kearneyi* ssp. *borjaensis Moran, subsp. nov. (Fig. 5)

A subspecie typica ramulis dense foliisque sparsim hirtellis floribusque aliquantum majoribus differt. Typus: Moran 7999 (SD 64051).

Shrub $\frac{1}{2}$ -4 m high, the trunk to 1 dm thick. Herbage hirtellous with colorless trichomes to 0.5 mm or on twigs to 0.8 mm long and also bearing tiny sessile or granular glands that become orange-red. Branchlets $1\frac{1}{2}$ -2 $\frac{1}{2}$ mm thick, reddish brown, glandular and densely hirtellous. Leaves simple, the petioles 3-6 mm long, 1-2 mm thick, glandular and hirtellous, the blades coriaceous, ovate to oblong-ovate, rounded to broadly acute at apex but commonly obtuse, cordate to broadly obtuse at base but commonly subcordate, entire or rarely glandular-serrulate at ends of main veins, 2 $\frac{1}{2}$ -4 $\frac{1}{2}$ (-6 $\frac{1}{2}$) cm long, 2-3 (-4 $\frac{1}{2}$) cm wide, with thickened and somewhat revolute margins and with about 6-12 conspicuous pale ascending veins on each side of midrib, dark green and commonly drying brownish above, paler and often densely glandular beneath, sparsely hirtellous on both surfaces and more densely so on margins and midrib beneath. Inflorescence terminal, a compact panicle $1\frac{1}{2}$ -3 cm long, the branches spicate, densely hirtellous and glandular, flowering in March and April. Bracts persistent, ovate to rhombic-reniform, acute or obtuse, 2 $\frac{1}{2}$ -3 mm long, 2-3 $\frac{1}{2}$ mm wide, densely pubescent on both surfaces. Bracteoles ovate, conduplicate, with broadly scarious margins, 2 $\frac{1}{2}$ -3 mm long, ciliate and somewhat pubescent. Sepals ovate, rounded at apex, cupped, 2 $\frac{1}{2}$ -3 mm long, 2-2 $\frac{1}{2}$ mm wide, ciliate with non-glandular hairs, otherwise glabrous or sparingly pubescent. Petals white or pink, rhombic-obovate, 4-5 $\frac{1}{2}$ mm long, 2-3 mm wide, slightly puberulent on midrib within, not ciliate. Filaments $1\frac{1}{2}$ -2 mm long, glabrous; anthers ca. 1.5 mm long and 1.2 mm wide. Ovary pubescent. Fruit 8-11 mm long and wide, 4-5 mm thick, red, densely glandular, densely pilose with trichomes to 1 mm long.



Figure 5. Left: type specimen of *Rhus kearneyi* ssp. *borjaensis* (7999), from the Sierra San Borja, x 0.23. Right: herbarium specimen of *Rhus kearneyi* ssp. *virginum* (11780), from the Sierra Santa Lucía, x 0.23. This collection has the longest leaves of any.

Type collection. — Occasional at about 1400 meters elevation near the summit of Cerro de la Mina de San Juan, Sierra San Borja, Baja California, Mexico (near 28°43'N, 113°38'W), 23 March 1960, *Moran 7999* — holotype: SD 64051; isotypes: K, MEXU, UC, US, etc.

Distribution. — Sierra San Borja, mostly at 1100 to 1650 meters elevation but in canyons occasionally down to 800 meters. Other collections: Arroyo de la Mina de Santa Marta, 1100 m (seen to 1450 m), *9764*; W rim of Tigre Cañon, 1200 m, *9927*; Cañon el Terminal, 800 m, *8398*; Cerro Quemazón, 1450 m, *8071*; Cerro la Sandía, 1650 m, *11527*.

Discussion. — This plant appears to differ from *R. k. kearneyi* chiefly in its denser and much longer pubescence and its slightly larger flowers.

Of the other five species included by Barkley (1937) in his section *Styphonia*, only *R. standleyi* Barkley, from southeast Mexico, and *R. muelleri* Standley & Barkley, from northeast Mexico, have spreading pubescence. *Rhus standleyi* differs from the present plant in its larger, sessile, subrugose leaves, which are more closely covered with softer pubescence and have more strongly revolute margins. *Rhus muelleri* has broader and more rotund leaves, smaller sepals, and ciliate petals.

This subspecies seems well isolated from its closest relatives (fig. 4). At least in brief explorations I did not find it in the Sierra San Luis to the northwest or in the Sierra San Juan or the Sierra San Francisco to the southeast. It is named for the mountain range to which it is apparently confined. The name "Sierra San Borja" for this range is selected perhaps somewhat arbitrarily from those used on maps for various parts of the range, the other names being Sierra de Calmalli, Sierra San Lino, and Sierra San Juan; still other names not appearing on maps are used locally.

***Rhus kearneyi* ssp. *virginum* Moran, subsp. nov. (Fig. 5)**

A subspecies typica foliis majoribus, acutis subacuminatisve differt. Typus: Moran 11664 (*SD 59520*).

Shrub or small tree 2-5 m high, the trunk to 2 dm thick, the bark rough, brown. Herbage puberulent with more or less spreading often curved colorless trichomes mostly less than 0.2 mm long and also bearing tiny sessile or granular glands that become orange-red. Branchlets 1-2½ mm thick, reddish brown, at first glandular and densely puberulent. Leaves simple, the petioles 3-14 mm long, 1-2 mm thick, the blades coriaceous, oblong-ovate, rounded to acuminate at apex but mostly acute, mostly rounded or subcordate at base, entire or glandular-serrulate with tooth at end of each main lateral vein, 3-6 (-8½) cm long, 1½-3 (-4) cm wide, with thickened and revolute margins and with 7-12 conspicuous pale ascending veins on each side of midrib, dark green above, paler and often densely glandular beneath, moderately puberulent to subglabrate on veins and sparsely puberulent to glabrate between. Inflorescence a terminal spike or compact panicle of spikes, flowering in September and October and rarely in February. Bracts persistent, rhombic-ovate, obtuse to subacute, cupped, strongly keeled, 2-3 mm long, 2½-3 mm wide, appressed pubescent within and without, pink. Sepals ovate, rounded at apex, cupped, 2-2½ mm long, 1½-2 mm wide, pink, ciliate with non-glandular hairs, otherwise glabrous. Petals white, narrowly obovate, rounded at apex, 3-3½ mm long, 1.2-1.8 mm wide, non-ciliate, puberulent at base within, otherwise glabrous. Filaments 1-1½ mm long; anthers 0.8-0.9 mm long, 0.7-0.8 mm wide. Ovary pubescent. Fruit not seen.

Type collection. — Occasional in arroyo at 1500 meters elevation, east slope of Volcan las Tres Vírgenes, Territorio de Baja California Sur, Mexico (near 27°28'N, 112°35'W), 11 February 1964, *Moran 11664* — holotype: SD 59520; isotypes: MEXU, UC, US.

Distribution. — Upper north slopes and downward along arroyos, Sierra de las Tres

Vírgenes, Sierra Santa Lucía, and Sierra de la Giganta, Baja California, at elevations of 1000 to 1750 meters. Other collections: N slope near the summit of Cerro Azufre, 1680 m, 11640; arroyo on E slope of Cerro Barranco, Sierra Santa Lucía, 1400 m, 11780; Cañada de Quemado, S side of Cerro Giganta, 1000 m, *Carter & Moran 5270* (SD, UC); N slope near summit, Cerro del Barreno, Sierra de la Giganta, 1350 m, *Carter & Moran 5358* (SD, UC).

Discussion. — The abundance and the associates of *R. k. virginum* vary from one area to another. It is fairly common at from 1200 to 1750 meters in the Sierra de las Tres Vírgenes, where associates include *Quercus ajoensis* C. H. Muller, *Bernardia incana* Morton, *Rhus laurina* Nutt., *Rhus ovata* S. Wats., *Ceanothus oliganthus* Nutt., *Rhamnus insula* Kell., and *Aralia scopulorum* Brandegee. In the Sierra Santa Lucía, where I saw it only locally, associates include *Prunus ilicifolia* cf. ssp. *lyonii* (Eastw.) Raven, *Aralia scopulorum*, and *Randia megacarpa* Brandegee. In the Sierra de la Giganta, associates include *Celtis reticulata* Torr. and *Acacia goldmanii* (Britt. & Rose) Wiggins at the lower locality, where again I saw it only locally, and *Aralia scopulorum* at the upper, where I saw only one tree.

Unlike the other two subspecies, *R. k. virginum* appears to flower mainly in fall. In the Sierra de las Tres Vírgenes in February and the Sierra Santa Lucía in March, 1964, I found only one flowering plant, and that with very few flowers; the others lacked even young inflorescences. In the Sierra de la Giganta in September 1967, the plants were just beginning to flower.

Rhus k. virginum differs sharply from *R. k. borjaensis* and resembles *R. k. kearneyi* in the sparseness of its pubescence. It differs from both in its leaves, which are mostly acute or even acuminate and often somewhat larger. Also, the leaves usually dry light green, whereas in the other two they are darker and often brownish. In *R. k. virginum*, many though not all leaves have glandular teeth, the percentage varying in different collections. Such teeth are poorly developed in *R. k. kearneyi* and in most collections of *R. k. borjaensis*, though on one vigorous shoot of the latter (9764 SD) the unusually large leaves have well developed teeth. Lack of material prevents a thoroughgoing comparison of floral details, but at least the anthers of *R. k. virginum* seem smaller than in the other two, and the sepals are glabrous.

Hedeoma martirens Moran, spec. nov. (Fig. 6)

Herba glandulosa hispidula perennis, rhizomata gracilia elongata emittens, caulibus gracilibus ½-1 ½ dm altis. Folia brevipetiolata, ovata ad elliptica, obtusa, 3-9 mm longa, 2-6 mm lata, supra glabra, margine revoluta. Cymulae paucae, uniflorae. Calyx subcylindricus, 7-9 mm longus, fauce dense annulatus, dentibus duobus inferioribus 2-3 mm longis, erectis, tribus superioribus tertia parte connatis, 1 ½-2 mm longis, aetate excurvatis. Corolla alba, 19-24 mm longa, tuba gracillima, cum fauce 17-20 mm longa. Typus: Moran 15069 (SD 67322). Inter congeneros corollae tubo perlongo distinguitur, rhizomatibusque gracilibus elongatis insignis. H. tenuifloro affinis sed foliorum petiolis brevioribus laminisque supra glabris inflorescentiaque reducta praeterea differt.

Low rhizomatous perennial herb with wiry stems, the herbage with glands secreting tiny yellow globules at the surface, hispidulous with often curved and often unequal tapering pluricellular white trichomes to 0.6 mm long, in sunny places stems and undersurfaces of leaves often purplish red. Rhizomes woody, to 5 mm thick, with dark brown bark; aerial shoots often branching below and often crowded, flexuous, ½-1 ½ dm tall, ½-¾ mm thick, glandular and hispidulous with more or less decurved trichomes, quadrangular, the two faces below each leaf pair slightly convex, the other two channeled, the upper internodes ca. 3-5 mm long; young rhizomes like the aerial shoots but to 3 dm long, stramineous, often scarcely or not at all hispidulous, glandular-puberulent or (only after the first season?) glabrous, the



Figure 6. Pressed specimen of *Hedeoma martirensis* (15275), from the high Sierra San Pedro Mártir, x 0.75.

internodes $\frac{1}{2}$ -1 $\frac{1}{2}$ cm long, the scale leaves sessile, ovate, blunt, ca. 1 mm long. Leaves petiolate, the blade coriaceous, from ovate in the lower to elliptic in the upper, obtuse to rounded at apex, cuneate to rounded at base, entire, 3-5 (-9) mm long, 2-3 (-6) mm wide, dorsally glandular-pitted or subrugose and sparsely antrorse-hispidulous, ventrally eglandular and glabrous or scabrous with a few stout conic trichomes ca. 0.05 mm long, the margins revolute, the midrib slightly projecting dorsally, the 2-3 pairs of ascending lateral veins obscure, the petiole 1-2 mm long, channeled ventrally. Flowers May to August, the cymules at 1-4 upper nodes, one-flowered, the peduncle $\frac{1}{2}$ -2 mm long, with an apical pair of linear bracts 1-2 mm long, the pedicel 2-3 mm long, spreading. Calyx 7-9 mm long, commonly purplish, the tube subcylindric but slightly ampliate upward and in fruit slightly swollen in lower third, 4 $\frac{1}{2}$ -6 $\frac{1}{2}$ mm long, ca. 1 mm wide (pressed to 1 $\frac{1}{2}$ mm wide), with 13 prominent ribs, sparsely hispidulous on ribs towards the base with trichomes ca. 0.3 mm long and glandular puberulent, glabrous within except for a dense ring at the throat of upwardly appressed and partially exerted stiff white trichomes ca. 0.6 mm long, the teeth triangular-lanceolate, sparsely hispidulous-ciliate, the lower two erect, 2-3 mm long, subulate above, the upper three connate one-third, 1 $\frac{1}{2}$ -2 mm long, slender-acute, in age somewhat outcurved. Corolla white or slightly tinged with pink, 19-24 mm long, glabrous in lower 3-4 mm, hirtellous above with trichomes ca. 0.2 mm long, the tube 14-15 mm long, ca. $\frac{1}{2}$ mm wide below and scarcely wider above, sparsely hirtellous within over more or less of upper half, the throat 3-5 mm long, 1 $\frac{1}{2}$ -2 mm wide above, glabrous within, the upper lip 2-3 mm long, 1 $\frac{1}{2}$ -2 mm wide, emarginate to a depth of 0.2-0.6 mm, minutely papillose-puberulent within, the lower lip 3-4 $\frac{1}{2}$ mm long, 3-4 mm wide (spread out), minutely papillose-puberulent, the middle lobe 1 $\frac{1}{2}$ -2 mm long, 1 $\frac{1}{4}$ mm wide, slightly emarginate, upcurved, the lateral lobes ca. 1 mm long and wide. Filaments ca. 3 mm long, exerted ca. 1 mm, glabrous; anthers divaricate, purple, ca. $\frac{1}{2}$ mm long; vestiges of other stamens ca. 0.3 mm long. Style 18-23 mm long, glabrous, the posterior lobe about half the anterior or subobsolete. Nutlets reddish brown, elliptic, 1.4-1.6 mm long, 0.6-0.7 mm wide, 0.5 mm thick.

Type collection. — Rock crevices on east slope at 2700 meters elevation, east rim of the Sierra San Pedro Mártir north of Yerba Buena, Baja California, Mexico (near 31°01'N, 115°26'W), 1 June 1968, *Moran 15069* — holotype: SD 67322; isotypes: K, MEXU, UC, US, etc.

Distribution. — Abundant locally on north and east slopes at 2300 to 2800 meters elevation, especially in shade but also in the open, north central Sierra San Pedro Mártir. Other collections: E slope at head of Arroyo Copal, 2300 m, 15463; N slope of Cerro "2828", 2575 m, 15446; E slope of Cerro "2828", 2800 m, 15266, 2750 m, 15275.

Discussion. — This plant grows most luxuriantly on north slopes in open pine-fir forest, where it may spread among rocks to form a rather uniform though scarcely dense groundcover. On the steep eastern escarpment of the Sierra, it grows also on drier and more open slopes and, at its lower limit, into the border of the montane chaparral.

Hedeoma martirensis is noteworthy for its slender rhizomes and somewhat matting habit. The long slender corolla is also remarkable, the tube plus the throat being 17 to 20 mm long and the tube proper less than 1 mm wide. To judge from the descriptions of Epling and Stewart (1939), the length is approached only in *H. costatum* A. Gray, where it is 6 to 18 but commonly 11 to 15 mm, and in *H. quercetorum* Epling, where it is 14 to 16 mm (less in a recent collection, annotated by Robert S. Irving). The variable *H. costatum*, ranging from Arizona to Texas and northern Mexico, is a somewhat coarser plant, with longer internodes and larger leaves; the leaves are serrate and more acute, pubescent on both sides, and thinner, with more prominent veins; and each cymule has three to several flowers. In *H. quercetorum*, of northeastern Mexico, the stems are less branching and less flexuous, the pubescence of stems and leaves is shorter and finer, each cymule has one to several flowers, the calyx tube is curved, and the upper leaves are longer and linear-elliptic, with prominent lateral veins more or less parallel to the midrib. However, the lower leaves are similar to those of *H. martirensis*, being ovate with revolute margins, rather thick with the veins often obscure, purplish red beneath, and nearly as small.

Epling and Stewart divided the genus into twelve unnamed but numbered sections. Though not exactly fitting their sectional definition, *H. martirensis* seems closest to section 9, in which they placed *H. costatum*, *H. quercetorum*, and five other species. It is perhaps most closely related to the little-known *H. tenuiflorum* Brandegee, of the Sierra San Borja, some 175 miles to the south-southeast in Baja California. That is a bushier plant without rhizomes, with similar but more elliptic and sometimes toothed leaves hispidulous on both sides and with longer petioles; the cymules commonly are more numerous and commonly have three to several flowers each; and the corolla tube is about 13 mm long. That species occurs in a more arid habitat, not only farther south but also at lower elevations — at about 1475 meters and probably well below; associates include *Quercus turbinella* Greene, *Anemone tuberosa* Rydb., *Ribes quercetorum* Greene, *Vauquelinia californica* (Torr.) Sarg., *Dodonaea viscosa* Jacq., *Rhamnus insula* Kell., *Idria columnaris* Kell., and *Echinocereus engelmannii* (Parry) Rümpl.

***Monardella lagunensis* M. E. Jones ssp. *mediopeninsularis* Moran, subsp. nov.**
(Figs. 7, 12)

Suffrutex fragrans glandulosus hirtellus, trichomatibus plerumque 0.1-0.2 mm longis, caulibus gracilibus 3-8 dm altis e basi 1-4 cm crassa. Folia triangulo-ovata, apice rotundata, 8-20 mm longa, 4-12 mm lata, petiolis 1-8 mm longis. Capitula ½-2½ cm lata ca. 20-125-flora, bracteis adpressis submembranaceis, exterioribus ovatis 5-8 mm longis, interioribus angustioribus. Calyx 6-7½ mm longus, 13-nervatus. Corolla 9-10½ mm longa. Typus: Moran 12147 (SD 70685). A subspecie typica foliis parvioribus capitulis parvioribus ex



Figure 7. Pressed specimen of *Monardella lagunensis* ssp. *mediopeninsularis*, from Cerro Potrero, x 0.5; part of the type collection (12147).

floribus paucioribus parvioribusque constantibus trichomatibusque brevioribus differt.

Fragrant subshrub 3-8 dm high, with many slender branches from a woody base 1-2 or rarely 4 cm thick. Herbage hirtellous with slightly curved pluricellular white trichomes 0.1-0.2 mm long or on vigorous shoots rarely (10460) to 0.5 mm long; also glandular, the surface shallowly pitted, each pit supporting a viscid yellowish globule ca. 0.05-0.1 mm thick. Branches often taking two seasons to flower, often with lateral branches below by flowering time, at first ca. 1 mm thick and closely hirtellous with slightly deflexed trichomes, dying back about to middle after flowering, becoming woody below but rarely over 4 mm thick except at very base, the bark tan in new fissures, becoming gray, the lower internodes ca. ½-1 ½ cm long, the upper longer, sometimes to 6 cm. Leaves petiolate, the blade triangular-ovate, rounded at apex, rounded to cuneate or commonly somewhat attenuate at base, with 2-3 weak crenations on each side or commonly entire, 7-20 mm long, 4-10 (-12) mm wide, equally hirtellous above and beneath but more conspicuously pitted beneath, the midvein prominent beneath, with 2-4 arching laterals on each side, the margins somewhat revolute, the petiole 1-3 (-8) mm long. Heads in May and June or a few as early as February, 1 ½-2 (½-

2½) cm wide, each with ca. 20-125 flowers, the bracts appressed, thinner than leaves and somewhat membranous, with prominent veins, often purplish, glabrous ventrally except toward apex, hirtellous dorsally and closely ciliate with longer trichomes, the outer ovate, acute to narrowly rounded, 5-8 mm long, 2-5 mm wide, with lateral veins arching and nearly parallel to midrib, the inner oblanceolate or narrower, acute. Calyx 6-7½ mm long, ca. 13-nerved, often purplish, hirtellous, the teeth erect, narrow-triangular, acute, nearly equal, 1¼-2 mm long, hirtellous within. Corolla white or slightly tinged with pink or lavender, 9-10½ mm long, the tube 6-7 mm long, gradually ampliate above, sparsely retrorsely hispidulous inside and out in upper half, the lobes oblong, rounded at apex, 2½-3½ mm long, 0.6-0.9 mm wide, sparsely hispidulous outside and glandular, with 3-7 sessile yellow globules ca. 0.1 mm thick crowded at tip, the upper two lobes united ca. ⅓-½, the lower three free. Filaments glabrous or with a few hairs at base, apparently elongating markedly during anthesis, the lower two inserted near sinuses, 3-5 mm long, the others inserted on base of upper lip, 2-3½ mm long; anther sacs divergent. Style glabrous, apparently elongating markedly during anthesis, becoming ca. 11 mm long, the stigma lobes ca. 0.3 mm long. Nutlets oblong, tan, smooth, 1.1-1.4 mm long, 0.6-0.8 mm wide.

Type collection. — Common among rocks, mostly on the north slope, summit of Cerro Potrero at 1400 meters elevation, Baja California, Mexico (near 29°49'N, 114°37'W), 30 May 1965, *Moran 12147*—holotype: SD 70685; isotypes: K, MEXU, UC, US, etc.

Distribution. — Known only from four peaks in central Baja California (fig. 12), at 750 to 1900 meters elevation. Other collections: N slope of Cerro Santa María, 1200 m, *11481* [sterile]; steep north-flowing arroyo on W side of peak ca. 4 miles SE of Puerto Refugio, Isla Angel de la Guarda, 900 m, *10460*; arroyo on E slope of Volcan las Tres Vírgenes, 1500 m [seen to 1900 m], *11666*.

Discussion. — The four known localities for this plant are scattered over some 200 miles (fig. 12). I have partially explored various peaks in the intervening Sierras San Luis, San Borja, San Juan, and San Francisco, without finding it. At the three northern localities, it was found mainly or entirely on north slopes and at the southernmost, so far as I remember, mainly so.

The new subspecies differs from *M. l. lagunensis* in its smaller leaves, its smaller heads with fewer and smaller flowers, and its shorter trichomes. The leaf blades in *M. l. lagunensis* are mostly 12 to 22 mm long and in *M. l. mediopeninsularis* mostly 8 to 15. However, in the northernmost (and type) collection, with abundant material found in better condition than the other collections, a few vigorous shoots have leaf blades to 20 mm long. The heads in *M. l. lagunensis* are mostly 2 to 3½ but sometimes as little as 1½ cm wide, in *M. l. mediopeninsularis* mostly 1½ to 2 but occasionally 2½ cm wide. The flowers of *M. l. mediopeninsularis* are similar to those of *M. l. lagunensis* but proportionally smaller, the calyx, for example, 6 to 7½ mm long as compared to 7 to 9 and the corolla 9 to 10½ mm long as compared to 11 to 12. In *M. l. lagunensis* the longer trichomes are about 0.5 to 0.6 mm long. In the southernmost collection of *M. l. mediopeninsularis* the longer trichomes are about 0.2 mm long; in the next most southern collection (actually from closer to the two northern localities) they are mostly about 0.2 mm but on one vigorous shoot 0.4 to 0.5 mm long; and in the two northern collections they are about 0.1 mm long. *Monardella linoides* A. Gray, of the Sierra San Pedro Mártir and northward, might be said to continue the trend in decreasing trichome length, having one-celled trichomes about 0.05 mm long; but that is a distinct species, with narrower leaves and longer corollas.

Smaller-leaved specimens of *M. l. mediopeninsularis* resemble *M. thymifolia* Greene, of Isla Cedros; but in that species the leaf blades are 5 to 10 mm long, the trichomes about 0.5 mm long, and the corollas 12 to 14 mm long, with the tube conspicuously exerted from the



Figure 8. Old plant of *Eriogonum zapatoense*, on Islote Zapato, Isla Guadalupe, showing crooked decumbent stem; part of the type collection (15114), 21 June 1968.



Figure 9. Herbaceous young plant of *Castilleja fruticosa* (6687), south end of Isla Guadalupe, 27 March 1958. Note thickness of leaves.



Figure 10. Flowering plant of *Heterotheca martirensis*, in the high Sierra San Pedro Mártir, 14 September 1968; part of the type collection (15612).



Figure 11. Flowering plant of *Stephanomeria monocephala*, in the high Sierra San Pedro Mártir, 5 July 1968; part of the type collection (15261).

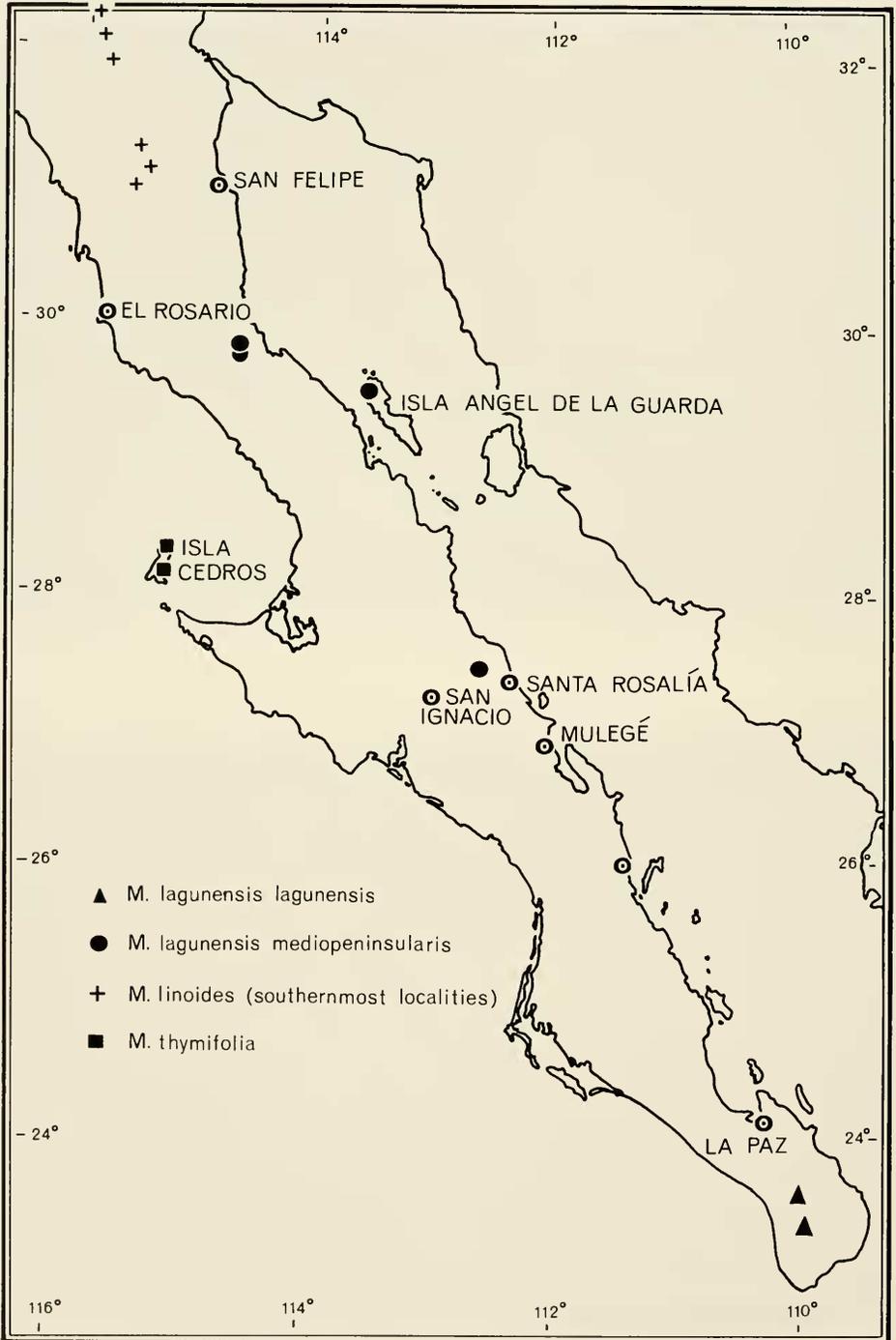


Figure 12. Distribution of *Monardella lagunensis* and related species.

calyx. In his monograph, Epling (1925) based his description of *M. thymifolia* on about eight sheets of four collections, mostly past flower. He commented that the few available specimens were uniform in appearance, and his description bespeaks uniformity (e.g. leaves 5-8 mm long, calyx 6-7 mm long, corolla 12-13 mm long). It is noteworthy that my two collections of the species, from stations well separated on Isla Cedros, agree rather closely with his description and so reinforce the appearance of uniformity. *Monardella lagunensis* seems quite distinct from *M. thymifolia*.

***Castilleja fruticosa* Moran, spec. nov. (Figs. 9, 13)**

*Planta perennis, glanduloso-puberula villosaque, 2-9 dm alta, caule lignoso, ad 4 cm diametro. Folia crassa, linearia, ½-6 cm longa, 1-5 mm lata, basi articulata, integra supremave trilobata. Spica densa, 2½-7 cm longa, 5-20-flora, miniata, bracteis 1-2½ cm longis, plerumque trilobatis. Calyx 14-21 mm longus, antice posticeque 8½-14 mm latere 0-4½ mm fissus, lobis subaequalibus, triangularibus usque oblongis. Corolla 17-26 mm longa, infra glabra, galea 9-13 mm longa, postice lutea dense glanduloso-puberula, marginibus hyalinis, anguste revolutis, labio inferiore 2-3 mm longo. Capsula 7-10 mm longa, lignosa, antice concava usque transverse sulcata, sero dehiscentis. Typus: Moran 15733 (SD 70310). Species caulibus duro-lignosis atque capsulis lignosis subindehiscentibus insignita. A *C. guadalupensi pubescentiae forma (illa tomentosa) et calyce antice posticeque aequaliter fisso valde differt.**

Woody perennial 2-5 or rarely 9 dm high and to 5 dm or more wide, but flowering while still herbaceous, perhaps in first season. Herbage glandular-puberulent, with trichomes mostly 0.05-0.3 mm long, and in part also villous, the longer trichomes pluricellular, tapering, unbranched, 1-2 mm long. Stem at first straight and erect, with several regular horizontal to ascending branches, with sympodial growth after flowering becoming crooked and irregularly close-branching, to 2 or rarely 4 cm thick, the wood hard and brittle, the bark mostly dark brown, the few longitudinal fissures lighter brown; branches villous. Leaves light green, rather succulent and the smaller ones subterete, linear-oblong to linear-oblongate, rounded to broadly acute, entire or the uppermost 3-lobed, articulated to a decurrent base and readily detached, ½-1½ mm wide at constriction, glandular-puberulent and the upper commonly somewhat villous near base, commonly ½-2½ cm long, 1½-3 mm wide, and 1-2 mm thick, the upper ones in favorable seasons sometimes larger, even 6 cm long and 5 mm wide, relatively thinner, and less clearly articulated at base; midvein translucent, often impressed ventrally and in thicker leaves sometimes also dorsally, the lateral veins not evident. Inflorescence terminal, a compact spike 2½-7 cm long, of 5-20 flowers, often densely villous, the bracts and calyx tipped with Indian orange, the pigment especially concentrated in the glandular trichomes; dead axis commonly persisting one or more seasons. Bracts 1-2½ cm long, ½-2 cm wide, generally glandular-puberulent and mostly somewhat villous, especially on lower margins and midribs, the lower ones sometimes entire and the uppermost sometimes 5-lobed but most 3-lobed, the lobes oblong to mostly spatulate, obtuse to rounded, the midlobe 3-9 mm wide, the lateral lobes ascending from near the middle, 1-3½ mm wide. Calyx glandular-puberulent, villous below, especially on nerves, 14-21 mm long, about equally cleft before and behind for 8½-12 mm, the segments 2½-4 mm wide, entire or mostly cleft 1-4½ mm into subequal triangular to oblong acutish lobes 1-2 mm wide, the anterior often slightly wider than posterior. Corolla 17-26 mm long, with 19 veins, glabrous below, sparsely glandular-puberulent towards middle; lower lip yellowish green, glandular-puberulent especially above, projecting abruptly anteriorly for 1½-2 mm and cupped upward for 2-3 mm, the apex 9-14 mm above corolla base, the lobes ca. 1 mm long and wide, acutish to rounded, the palate of two finlike yellowish

glandular evaginations ca. 1-1 ½ mm long and ¾-1 mm high, each continuing upward as a low ridge for ca. 1-1 ½ mm to the sinus; galea 9-13 mm long, when flattened 4 ½-8 mm wide at base and ca. 3 mm wide just below apex, exerted ca. 2-6 mm beyond calyx, slightly curved anteriorly, densely glandular-puberulent dorsally above, dorsally yellowish green becoming yellow and sometimes later reddish, the hyaline margins ca. 1 mm wide above and wider below, sharply differentiated above from the herbaceous center, closely rolled outward below, the apex rounded. Stamens glabrous, the anterior filaments 7 ½-16 mm long, inserted 7 ½-9 mm above corolla base, the posterior 7-15 mm long, inserted 6 ½-8 mm above corolla base; anthers 2-2 ½ mm long, ca. ¼ mm wide. Ovary glabrous, greenish, laterally compressed above and obliquely obovate, 2 ½-4 mm long, 1-1 ½ mm wide, 1 ½-2 mm thick, the rounded apex sometimes extending beyond the style base; style a continuation of the posterior keel, yellowish green, 17-25 mm long, exerted before anthesis and finally by 2-4 mm. Capsule woody, blackish, triangular-ovoid, tapering in width apically to a sharp sagittal keel continuous with low anterior and posterior keels, 7-10 mm long, 3 ½-5 mm wide and thick, the anterior surface concave to transversely and sometimes tightly infolded, with a furrow to 2 mm deep; persisting on dead inflorescence for one or more seasons mostly unopened even though containing well-formed seeds, the two cells occasionally separating slightly at apex and less often also the valves splitting lengthwise in upper fourth. Seeds dark brown, irregularly obovoid, 1.6-2.1 mm long and 1.0-1.2 mm wide including loose alveolate coat.

Type collection. — Occasional on barren mesa at 100 meters elevation, just east of the weather station, southwest corner of Isla Guadalupe, Baja California, Mexico (near 28°53'N, 118°17¼'W), 23 February 1969, *Moran 15733* — holotype: SD 70310; isotypes: K, MEXU, UC, US, etc.



Figure 13. Pressed specimen of *Castilleja fruticosa* (7850), from the south end of Isla Guadalupe, showing flowers and persistent capsules, x 0.75.

Distribution. — Local at the south end of Isla Guadalupe and on offlying Islote Zapato (Outer Islet). Other collections: S inner slope of red crater 1 mile N of Morro Sur, 320 m, 6479; 1 ½ miles NE of weather station, 220 m, 7850; type locality, 6142, 6687, 12068, 13768, Wiggins & Ernst 136 (DS, US), Carlquist 482 (RSA), Copp 175 (DS); Islote Zapato, Remple in 1937 (DS), Moran 2922 (CAS, DS, SD), 5657, 15113, Lindsay 1805 (DS, SD), 2624 (SD), in 1956 (SD), Kuijt, Miller, & Lindsay 1050 (UC).

Discussion. — This plant occurs on a barren volcanic mesa and in two craters near the south end of Isla Guadalupe, in an area of very low rainfall but of frequent fogs. Though fairly common locally, it is thus very narrowly restricted. In 1948 I collected it on Islote Zapato but failed to find it on the main island, even though I collected at the very spot on the mesa where its bright flowers are now conspicuous. In 1957 I did find it on the mesa but saw only herbaceous plants looking almost like annuals. In 1960 it was a little more widespread there than I have seen it before or since, and in 1967 and later, some plants were small shrubs with woody stems to 2 cm thick. These facts suggest that in 1957 *C. fruticosa* might recently have colonized the main island from one of the nearby islets. Although the goats that have ravaged the northern part of the island may never have been common at the desertic south end, comparison of the vegetation with that of the islets suggests that enough goats came to keep certain plants near the point of extinction. Since the establishment of the weather station in 1946, however, goats have visited the south end at their peril, and the vegetation thus has had some protection.

Among associated species, several are similarly restricted on the island. I have seen *Euphorbia pondii* Millsp. only in an even smaller colony in the same part of the mesa. The endemic *Hemizonia palmeri* Rose is confined to a slightly larger area within about one mile of the south end. The endemic *H. greeneana* Rose ssp. *greeneana*, one of the most abundant and conspicuous plants at the south end, extends north only about two miles; it occurs also on Islote Zapato and Islote Negro. The endemic *Baeriopsis guadalupensis* J. T. Howell has been found only at the south end and on Islote Zapato and Islote Negro, though possibly it occurs farther north on unexplored seacliffs. *Hutchinsia procumbens* (L.) Desv. has been found only at the south end and on Islote Zapato. *Euphorbia misera* Benth., common on Islote Zapato and very rare on cliffs in the northern canyons, also occurs rarely on the south-end mesa. *Lomatium insulare* (Eastw.) Munz likewise occurs on Islote Zapato and on the south-end mesa, and it occurs also on one cliff high at the north end of the island. These last two species, like *Castilleja fruticosa*, may possibly be recent colonists at the south end. A recent unsuccessful colonist there was *Lavatera occidentalis* S. Wats., which is common on Islote Zapato and is represented by two or three old shrubs on northern cliffs: a single robust seedling 1 meter high grew in an arroyo 3 miles from the south end in 1965, when the goat population was at a low ebb, but has since disappeared.

Castilleja fruticosa, though still herbaceous at first flowering, is remarkable for the thick and hard woody stems of older plants. Apparently it is one of the woodiest of the genus. The foliage leaves are quite thick and somewhat succulent, as is often true of maritime plants. The capsules are unusually hard and woody and are distinguished by a depression on the under side, which sometimes becomes a deep transverse groove, as if the capsule were caved in. On most specimens, capsules from previous years persist on dead inflorescence axes, mostly still unopened and still holding seeds. Seeds from closed capsules have proven viable.

Castilleja fruticosa falls in the section *Perichroma* Pennell (Pennell, 1935). The only recent treatment of any major part of the genus is that of Pennell (1951) for the 71 species of Washington, Oregon, and California — out of some 200 species all told. The genus is poorly represented in Baja California, with apparently only four species, including two Guadalupe

Island endemics, that do not occur also in Alta California; and the flora of Guadalupe Island is more closely related to that of Alta California than to that of peninsular Baja California. Nevertheless, the new species does not fit clearly into any of the 19 groups (apparently subsections) informally proposed by Pennell (1951). However, it is close to groups x through xvi, perhaps differing from all their species in having woodier stems and woodier and often tardily dehiscent transversely grooved capsules but otherwise differing from each mainly in the kind and distribution of pubescence.

This plant was first reported (Moran, 1951), and has since been identified in herbaria, as *C. guadalupensis* Brandegee, another Guadalupe Island endemic with hard woody stems. That plant occurs (or occurred) in a different habitat, on the higher and much moister northern part of the island. It has not been collected since 1898 and evidently is now very rare if not extinct. Herbarium material is meager.

The little-known *C. guadalupensis* is a woody plant 3 to 6 dm tall, whose stems, leaves, and calyx are at first densely and closely tomentose with dendritic hairs. The leaves are narrowly spatulate, rather thin, to 6 cm long and 1 cm wide. Brandegee (1903) described the calyx as "cleft equally before and behind about one-half its length", as in the presumably related *C. foliolosa* H. & A.; but in three fairly well exposed flowers of one Palmer specimen (GH) it clearly is cut about twice as deeply behind as before — as in no other species known to me. The corolla is slightly longer to slightly shorter than the calyx; the galea, about equalling the tube, is densely puberulent the length of the back with pluricellular but unbranched non-glandular trichomes about 0.1 to 0.2 mm long. The style is exerted about 3 to 5 ½ mm. Clearly this is a very distinct species.

Castilleja fruticosa thus is amply different from *C. guadalupensis*, notably in the cutting of the calyx but also in the type of pubescence and in the form and size of the leaves.

Hemizonia greeneana Rose ssp. **peninsularis** Moran, subsp. nov. (Fig. 14)

Frutex glanduloso-viscidus prostratus vel erectus tum quoque ad 12 dm altus ramis virgatis. Folia inferiora subremota filiformia usque lineare-oblongeolata integra vel 2-8-dentata hirsuta 2-7 cm longa, superiora conferta linearia plerumque hirtella ½-1 cm longa ½-1 mm lata. Capitula thyrsoides plerumque 8-radiata, primis usque 14-radiatis. Involucra 4-7 mm alta, 4-6 mm diametro, bracteae receptaculi 8-13 uniseriatis ad medium infirme connatis. Disci flores 8-21 steriles, pappo 1.9-3.3 mm longo, paleis 9-15. Typus: Moran 13437 (SD 70684). A ssp. greeneana ramis plantarum altiorum virgatis, foliis infimis saepe longioribus remotioreque dentatis, superis plerumque hirtellis, pappo plerumque longiore paleisque numerosioribus differt.

Prostrate or erect shrub 2-8 or reportedly to 12 dm high and ½-1 ½ m or more wide, with herbage glandular-viscid throughout. Stems to 4 cm thick at base, the bark gray-brown. Branches commonly virgate, hirsute with multicellular white trichomes to 3 mm long, rather sparsely leafy below, the internodes ca. ½-1 ½ cm long, the axils sometimes later floccose, only the lowermost leaves opposite, the middle axils often with fascicled leaves, the upper mostly with leafy branchlets; ultimate branchlets or peduncles ca. ½ mm thick, hirtellous, closely leafy, with shorter internodes and fascicled leaves. Lower leaves filiform to linear-oblongeolate, acute, 2-7 cm long, ½-5 mm wide, with subrevolute or thickened margins, entire or often with 2-8 ascending acute teeth or lobes to 5 mm long and 1 ½ mm wide, hirsute with trichomes to 1 mm long, somewhat succulent and to 2 mm thick in plants nearest the shore; upper leaves gradually smaller, entire, those of the peduncles linear-oblong, obtuse, ca. ½-1 cm long and ½-1 mm wide, sparsely hirtellous or subglabrous except for glands. Heads borne sometimes at least from March to November near the shore but mostly in summer above, often numerous and subcorymbose at ends of main branches, solitary or few



Figure 14. Type specimen of *Hemizonia greeneana* ssp. *peninsularis* (13437), from Punta Banda, x 0.25.

and cymose on the branchlets, yellow, 11-18 mm wide, mostly 8-rayed, but some early ones with more rays and the first, terminating the main branches, with as many as 14. Involucre campanulate, 4-7 mm high, 4-6 mm wide, sparsely hirsute, beset with peglike glands ca. 0.05 mm high and each tipped with a sticky yellowish globule ca. 0.1 mm thick, the bracts lanceolate, acute, cymbiform and strongly keeled in lower three-fifths and ca. 2 ½ mm wide (flattened), with hyaline margins, narrowed to a flatter thickish apex 2-3 mm long. Ray florets 8-14, the tube, 1 ½-2 ½ mm long, stipitate-glandular, the ray oblong to obovate, truncate and 2-3-crenate at apex, 4 ½-6 ½ mm long, 2 ½-3 ½ mm wide, subglabrous, the style branches slender, 2-3 mm long. Receptacular bracts 8-13 (about as many as the rays), in one series, weakly united to middle, oblanceolate, narrowly acute (ca. 30°), 5-6 mm high, to 1 ½ mm wide, herbaceous with hyaline margins, glandular, the apex sparsely long-ciliate. Disk florets 8-14 (-21), the corolla 4-5 mm long, the tube slightly ampliate above, subglabrous, the lobes triangular-ovate, ¾-1 mm long, thickened and densely puberulent ventrally on margins, the anthers yellow, ca. 2 ½ mm long, the stigma lobes ca. 2 mm long, the achenes sterile, 2-2 ½ mm long, sparsely glandular-puberulent, the pappus 1.9-3.3 mm long, the paleae 9-15, free or united at base, unequal, irregularly lanceolate or oblong, stiff, white. Ray achenes 2-3 mm long, triquetrous, black, transversely rugose, acute and stipitate at base, rounded at apex, with an upcurved lateral beak 1-2 or rarely 3 times as long as thick.

Type collection. — Occasional on east, north, and west slopes at 380 meters elevation,

summit of Banda Peak, Punta Banda, Baja California, Mexico (near $31^{\circ}44\frac{1}{2}'N$, $116^{\circ}43\frac{3}{4}'W$), 27 August 1966, *Moran 13437* — holotype: SD 70684; isotypes: K, MEXU, UC, US, etc.

Distribution. — Local on the northwest coast of Baja California southwest of Ensenada and midway between there and Tijuana. Other collections: northfacing cliff at mouth of Río San Miguel (or Guadalupe), 5 m, *Higgins* in 1946 (SD), *Howe* in 1964 (SD), *Moran 13155*, *13431*, *14633*, *15376*, *16000*; rocky cliffs near ocean 37 miles S of border [probably the same locality], *Campbell* in 1937 (POM); Isla Sur, Islas de Todos Santos, *Brandeggee* in 1897 (UC?), *Moran 2803* (SBBG), *16210*, *Blakley 6590* (SBBG, SD), *6598* (SBBG, SD); N side of Punta Banda near tip, 5 m, *14638*; type locality, *15914*.

Discussion. — The new subspecies apparently is local on cooler parts of the coast, occurring chiefly on Punta Banda (Banda Promontory) and on the southern one of the Islas de Todos Santos, a disconnected part of that promontory. Otherwise it has been found only on one north-facing beach cliff 20 miles to the north. The annual rainfall on the Islas de Todos Santos is about 10 inches (*Hastings*, 1964), and the coastal area is subject to frequent fogs. In contrast, *H. g. greeneana* is endemic to the south end of Isla Guadalupe and the offlying islets, a hot dry area, again with frequent fogs but with an annual rainfall of perhaps less than 2 inches.

This plant was first collected in 1897 on the Islas de Todos Santos by T. S. Brandeggee (1899, 1900), though his specimens cannot now be found. He first thought it seemed "the same as specimens named *H. frutescens* Gray, collected by Dr. Palmer on Guadalupe Island, although neither of them exactly agrees with Dr. Gray's description of that species". But then, evidently from the same collection, he reported *H. greeneana* as "growing plentifully over the larger [southernmost] of the Todos Santos Islands." The Palmer specimens he mentioned must have been part of the type collection of *H. greeneana*, but it is not clear how Brandeggee saw specimens labeled as *H. frutescens*.

As noted by *Moran* (1950), Dr. D. D. Keck considered the Todos Santos plant a new species; but he has never published it. His conclusion was first based only on Brandeggee's collection, though apparently later supported by mine (2803). Material now available shows that both the original *H. greeneana*, of Isla Guadalupe, and the Todos Santos plant are more variable than was then evident, and their variation is roughly parallel. The differences noted below are mostly not clear-cut but subject to exception. Thus the two plants do not appear as different or as distinct as they might have before, and they are perhaps best treated as subspecies of one species.

Plants of *H. g. greeneana* may be prostrate in exposed places; but though commonly taller, they are still moundlike, with arching branches, even in the most sheltered places. They are generally compact, the inflorescence being densely leafy and often many flowered and even the lower internodes being short. On steep north slopes near the shore, plants of *H. g. peninsularis* also grow prostrate, and elsewhere they may have somewhat arching branches; but commonly they are more erect and more open, often with virgate branches and mostly with longer internodes below.

In *H. g. greeneana* the leaves often are glabrous except for the glands but sometimes are sparsely hirsute or villous-hirsute. The lower leaves are about 2 to $4\frac{1}{2}$ cm long, seldom entire but mostly with 4 to 12 teeth or lobes. In *H. g. peninsularis* the leaves, especially the uppermost, may be glabrous except for the glands; but commonly they are hirsute or hirtellous, the trichomes on middle and upper leaves being generally shorter and stiffer than in *H. g. greeneana*. The lower leaves are commonly longer (to 7 cm) and relatively if not actually narrower, with fewer teeth or lobes, which are thus more remote.

In *H. g. greeneana* the pappus of the disk achenes is about 1.3 to 2.2 mm long, of about 6

to 11 paleae, whereas in *H. g. peninsularis* it is about 1.9 to 3.3 mm long, of about 9 to 15 paleae. The reduction in *H. g. greeneana* might seem another example of decrease or loss of dispersability in island plants (cf. Carlquist, 1966). However, the disk achenes are sterile in all species of the section *Zonamra*, to which this species belongs.

The beak of the achene in *H. g. greeneana* is mostly 2 to 3 times as long as thick, in *H. g. peninsularis* mostly 1 to 2 times as long as thick; but there are exceptions in both directions.

Hemizonia palmeri Rose, another member of the section *Zonamra*, is endemic with *H. g. greeneana* at the south end of Isla Guadalupe, but in an even smaller area. It is a smaller, prostrate, rather woody plant, with silky-strigose mostly entire leaves, the heads apparently rather constantly with 8 rays and with about 10 to 12 disk florets. Apparently *H. palmeri* flowers mainly in winter and *H. g. greeneana* more or less the year around. Hybrids are rare, and the two species remain quite distinct.

Hemizonia greeneana is more similar to *H. clementina* Brandegee and to *H. frutescens* A. Gray. *Hemizonia clementina* is restricted to five of the islands off southern California, varying somewhat from island to island (Carlquist, 1965: 115 ff.). *Hemizonia frutescens* is endemic to the high northern part of Isla Guadalupe, a cooler and moister area than the low south end where *H. g. greeneana* grows. Since the discovery of *H. frutescens* in 1875, when goats were already abundant, shrubby plants have been rare and confined to cliffs, though Greene (1885) reported it "common on level ground and hillsides and, in such places, strictly annual". It is now known only on one north-facing cliff at 800 meters elevation, where about 20 plants are visible. There it is a shrub about 6 dm high, with virgate branches. Since it is poorly represented in herbaria, detailed comparison with *H. greeneana* is difficult. In habit and leaf form, both *H. clementina* and *H. frutescens* are more similar to *H. g. peninsularis* than to *H. g. greeneana*, which is divergent perhaps in connection with the more desertic conditions under which it grows.

The heads of *H. greeneana* were described as having 8 rays, as at most seasons they do. In both subspecies, however, early heads, terminating the main branches, may have 12 to 14 rays, a corresponding number of involucrel and of receptacular bracts, and a correspondingly large number of disk florets, sometimes as many as 21. Thus in head structure *H. greeneana* is intermediate between the more primitive *H. clementina* and the more advanced *H. frutescens*. Except for having only a single series of receptacular bracts, the early heads of *H. greeneana* rather closely resemble the heads of *H. clementina*, which regularly have 12 to 14 rays and 15 to 30 disk florets. As the leaves of the two also are similar, *H. g. peninsularis* in early flower can be confused with *H. clementina*. On the other hand, the later heads of *H. greeneana* resemble the heads of *H. palmeri* and *H. frutescens*. In *H. frutescens*, to judge from scanty (and possibly inadequate) material, the number of rays is mostly 8 and rarely 9, even in terminal heads of the main stems. *Hemizonia frutescens* differs from *H. greeneana* further in its paler and perhaps thinner leaves and its longer and softer pubescence. In form, color, and vesture of leaves, though not in habit, it bears a suggestive resemblance to putative natural hybrids of *H. palmeri* with *H. g. greeneana*.

***Heterotheca martirensis* Moran, spec. nov. (Fig. 10)**

Planta humilis perennis, rhizomata gracilia ad 1½ dm longa foliis squamiformibus amplectentibus ovatis obtusis ciliatis 2-4 mm longis instructa emittens. Caules graciles, 1-10 cm longi. Folia spatulata, mucronata, 1-2½ cm longa, 3-7 mm lata, vulgo utrinque hirsuta. Capitula solitaria, discoidea, flava, plerumque 20-42-flora, pedunculis gracilibus 1-6 cm altis 0-2-bracteatis. Involucrea campanulata, 6-9 mm alta, 4-6 mm lata, bracteis 24-48, in 3-4 seriebus imbricatis, lanceolatis, acutis, margine scariosis purpurascensibusque, exterioribus ca. 2 x ½ mm, interioribus ad 8 x 1-1½ mm. Corollae 5-7 mm longae. Achenia compressa,

cuneata, 3-4 mm longa, 0.8-1.1 mm lata, 10-costata, villosa. Pappi setae sordidae, interioribus 35-55, 4-7 mm longis, exterioribus 20-30, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm longis. Typus: Moran 15612 (SD 69534). Ob habitum humilium rhizomatousum atque capitula solitaria discoidea insignis. Aliter in toto genere tantum *H. breweri* et *H. oregona* capitula discoidea ferunt; hae herbae erectae elatioresque sine rhizomatibus et cum capitulis plus minusve corymbosis sunt.

Mat-forming rhizomatous perennial, from a rootcrown to 1 cm thick. Rhizomes purplish at first, to 1 $\frac{1}{2}$ dm long, ca. 1 mm thick, the internodes 1-3 mm long, the scale-leaves clasping, triangular-ovate, obtuse, purple becoming brown, 2-4 mm long, hirsute-ciliate, the upper passing into foliage leaves. Herbage hirsute with spreading to ascending pluricellular white trichomes $\frac{1}{2}$ -2 mm long and glandular with truncate-conic white trichomes to 0.15 mm long, each tipped with a viscid yellow globule. Stems slender, 1-10 cm long above ground, erect or decumbent, mostly leafy throughout though on longer stems the lower leaves more scattered. Leaves thick, spatulate, 1-2 $\frac{1}{2}$ cm long, 3-7 mm wide above, $\frac{1}{2}$ -1 mm wide above the broadened clasping base, mucronate with the whitish conic mucro commonly deflexed and inconspicuous, glandular throughout, closely hirsute-ciliate at base, at least sparsely hirsute on midrib dorsally but more often evenly hirsute on both surfaces, the midrib impressed ventrally and projecting dorsally, the lateral veins ca. 3 on each side, looping, mostly obscure. Heads discoid, yellow, solitary, flowering May to September, the peduncles slender, 1-6 cm tall, glandular, hirsute or not, naked or with 1 or 2 linear bracts 2-3 mm long. Involucre campanulate, 6-9 mm high, (2-) 4-6 mm wide (to 16 mm wide pressed), of 24-48 bracts well imbricated in 3 or 4 series, the bracts erect, lanceolate to linear-lanceolate, acute, herbaceous and (at least the outer) glandular, purplish-scarious at margins, fimbriate above, with a prominent colorless or purplish midrib, the outer ca. 2 mm long and $\frac{1}{2}$ mm wide, the inner to 8 mm long, 1-1 $\frac{1}{2}$ mm wide. Receptacle convex, alveolate. Florets (4-) 20-42; corolla slender-funnelform, 5-7 mm long, yellow or becoming saffron red, the segments erect, triangular-ovate, acute, 0.5-0.8 mm long; style branches flattened, linear, blunt, 1.5-1.9 mm long, the appendage puberulent, about equalling to twice exceeding stigmatic part. Achenes tan, cuneate, compressed, 3-4 mm long, 0.8-1.1 mm wide, 0.6-0.7 mm thick, with 10 low ribs, villous with ascending trichomes $\frac{1}{2}$ -1 mm long. Pappus sordid, double, the inner of 35-55 unequal slender barbellate bristles 4-7 mm long, the outer of ca. 20-30 similar bristles $\frac{1}{2}$ -1 $\frac{1}{2}$ mm long or some of them slightly broadened and scalelike. Somatic chromosome number: $2n = 18$.

Type collection. — Common in crevices on flat granitic surfaces at 2800 meters elevation, north slope of Cerro "2828", east rim of the Sierra San Pedro Mártir, Baja California, Mexico (near 31°02'N, 115°27'W), 14 September 1968, *Moran 15612* — holotype: SD 69534; isotypes: K, MEXU, UC, US, etc.

Distribution. — Rather common, mostly on rocks, in full sun or partial shade, at 2050 to 2800 meters elevation in the north central Sierra San Pedro Mártir. Other collections: Cerro Venado Blanco, 2750 m, *15634*; E slope at head of Arroyo Copal, 2500 m [seen to 2300 m], *15435*; 2 miles E of Corral de Sam, 2050 m, *16531*; type locality, *15053*; SW slope above Yerba Buena, 2500 m, *Moran & Thorne 14196*, *Moran 15067*; Los Llanitos, 2500 m, *Moran & Thorne 14257*.

Discussion. — The new species is placed in *Heterotheca* Cass. as emended by Shinnery (1951) to include *Chrysopsis* (Nutt.) Ell. The only other species with discoid heads are *H. breweri* (A. Gray) Shinnery and *H. oregona* (Nutt.) Shinnery, both erect herbs with branching stems bearing several heads. From both these species, *H. martirensis* differs conspicuously in its low and rhizomatous habit, its solitary pedunculate heads, and its better developed outer pappus. Very likely it is more closely related to some of the radiate species of the Rocky Mountain area. In particular, it is similar in habit, leaf shape (including the

mucronate tip), and pubescence, to *Chrysopsis jonesii* Blake, of southern Utah, though that plant is more compact, with smaller leaves and smaller sessile heads.

Brandegee (1893) listed *Chrysopsis* sp. from the Sierra San Pedro Mártir with no comment. I have seen no collection of his.

For the type collection of *H. martirensis*, Dr. R. C. Jackson reports a somatic chromosome number of $2n = 18$.

***Stephanomeria monocephala* Moran, spec. nov. (Fig. 11)**

Planta pulvinata, ad 3 dm lata. Folia rosulata 5-15 oblanceolata, acuta, 1/2-3 1/2 cm longa, 1-5 mm lata, sparsim glanduloso-puberulenta, superne utraque margine inaequaliter 0-3-dentata. Pedunculi 1/2-8 cm alti, superne 0-2-bracteati. Capitula solitaria, 14-21 mm diametro, 5-8-flora. Involucra cylindracea, 7-9 mm longa, 2-3 mm lata, bracteis lanceolatis, interioribus 5-9 aequalibus, exterioribus 3-5 imbricatis. Corollae tubus 2 1/2-4 mm longus, ligula rosea, 4 1/2-9 mm longa, 2 1/2-4 1/2 mm lata, elliptico-oblonga, truncata, apice 5-lobata. Achaenia prismatica, 2 1/2-3 mm longa, lateribus anguste sulcata, costis minute scaberulis. Pappi setae persistentes, albae, biseriatae, interioribus 20, fere ad basin plumosis, 4-6 mm longis, exterioribus alternantibus, minutis. Typus: Moran 15261 (SD 68877). Species habitu pulvinato et capitulis solitariis distinctissima, pappi setis exterioribus minutis etiam insignita.

Plant caespitose, forming dense cushions to 3 dm wide and 1 dm high, the interstices packed solid with soil. Stems 2-5 mm thick, each branch with a rosette of ca. 5-15 leaves and covered below with persistent dead leaves. Leaves oblanceolate to linear-oblanceolate or occasionally spatulate, mostly acute, entire or commonly 1-3-dentate on each margin above, $1/2$ - $3\ 1/2$ cm long, 1-5 mm wide above, $1/2$ - $1\ 1/2$ mm wide above the broadened base, subglabrous or (in the same plant) commonly glandular-puberulent with pluricellular trichomes ca. 0.1 mm long, the teeth spreading or slightly reflexed, triangular, the upper mostly longer, to 1 mm long, the midrib prominent, the lateral veins obscure. Peduncle terminal $1/2$ -5 (-8) cm tall, slender, striate or angled, glandular-puberulent, often with 1 or 2 small lanceolate bracts above. Heads solitary, 10-12 mm high, 14-21 mm wide, with 5-8 but commonly 6 florets, flowering May to July. Involucre cylindric, 7-9 mm long, 2-3 mm wide, of 5-9 but mostly 6 equal bracts and 3-5 graduated shorter ones, the bracts lanceolate, acute to narrowly rounded, 1-2 mm wide, green or purplish with scarious margins, minutely granular-glandular and often also sparingly glandular puberulent, the longer ones sparsely villous at apex. Receptacle shallowly pitted, glabrous. Corolla 7-13 mm long, the tube whitish, $2\ 1/2$ -4 mm long, with a few scattered trichomes ventrally above, the ligule light to deep pink or rarely white, elliptic-oblong, truncate and 5-lobed, $4\ 1/2$ -9 mm long, $2\ 1/2$ - $4\ 1/2$ mm wide, the lobes 1- $1\ 1/2$ mm long and a third as wide, triangular-ovate, obtusish. Anthers $3\ 1/2$ -5 mm long, sagittate at base; pollen white. Style 7-12 mm long, lavender above, ascending-puberulent, the style branches ca. 1 mm long. Achenes light tan, pentagono-prismatic, only slightly narrowed towards base and apex, $2\ 1/2$ -3 mm long, 0.8-1.0 mm thick, the sides slightly channeled or nearly flat except for a straight shallow longitudinal groove ca. 0.1 mm wide, the angles sparsely and minutely ascending scaberulous. Pappus persistent, white, 4-6 mm long, double, the inner bristles ca. 20, stiff, slightly widened and connate at base, plumose nearly to base with pinnae 0.3-0.5 mm long, the outer bristles inconspicuous, alternating, very slender, smooth or scaberulous, mostly less than 1 mm long.

Type collection. — Common in crevices of north- and east-facing rocks and cliffs at 2800 meters elevation, Cerro "2828", east rim of the Sierra San Pedro Mártir, Baja California, Mexico (near $31^{\circ}02'N$, $115^{\circ}27'W$), 5 July 1968, *Moran 15261* — holotype: SD 68877; isotypes: K, MEXU, UC, US, etc.

Distribution. — Known only from the type locality. Other collections: 15064, 15332, 15403, 16533.

Discussion. — This plant appears to be quite limited as to habitat: despite wide collecting in the general area on several trips, I found it only in the one place. However, there are several similar cliffs on the east rim where it probably can be expected. Associated species include *Selaginella asprella* Maxon, *Sedum niveum* Davids., *Heuchera leptomeria* var. *peninsularis* Rosend., Butt., & Lak., *Saxifraga eriophora* S. Wats., *Potentilla wheeleri* S. Wats., *Haplopappus pulvinatus* Moran, and *Tanacetum bajacalifornicum* Moran.

Stephanomeria monocephala differs from others of the genus in its polster habit and solitary heads. The regular outer series of minute pappus bristles also is noteworthy; but although the pappus of *Stephanomeria* is always described as uniseriate, a variable number of similar tiny bristles occurs in several other species.

In other floral and fruiting characters, *S. monocephala* appears to be an average member of the genus. However, it differs from every other species in some combination of characters of involucre, flowers, achenes, and pappus. Mr. Leslie D. Gottlieb, a student of the genus, suggests that it is closest to *S. lactucina* A. Gray, native from eastern Oregon to Nevada and the Sierra Nevada. That is a larger plant, with stems arising singly from slender rootstocks and usually bearing several heads; the heads are larger, with more and larger florets; and the achenes are larger.

***Tanacetum bajacalifornicum* Moran, spec. nov. (Fig. 15)**

Herba aromatica caespitosa perennis, trichomatibus biramosis sparsim instructa. Folia basalia 2-5 cm longa, 1-2 cm lata, plerumque biternate divisa, segmentis linearibus, obtusis, 1-1 ½ mm latis, petiolo laminam excedenti. Caulis florifer 1-2 dm altus, capitulum unum vel plura ferens, foliis superioribus integris. Involucra hemisphaerica, 4-6 mm alta, 4-8 mm lata, bracteis 13-25, 3-seriatis, ellipticis, 1 ½-3 mm latis, marginibus scariosis purpurascensibus. Receptaculum nudum. Flores marginales pistillati 6-15, corollis 2 ½ mm longis, 4-dentatis. Flores disci perfecti 40-150, corollis 3 mm longis. Pappus nullus. Achenia non visa. Typus: Moran 15613 (SD 69075). A ceteris speciebus caespitosis turmae Sphaeromeriae foliis caulibusque sparsim pubescentibus nec argenteis differt. A T. capitato, cui foliorum forma similis est, capitulis majoribus minusque confertis, bracteis numerosioribus, et floribus numerosioribus majoribusque praeterea differt.

Aromatic caespitose perennial, to 2 dm wide. Caudex to 2 dm long and to 1 cm thick at base, the branches 2-5 mm thick, brown below with persistent shingled leaf bases. Herbage at first thinly canescent with appressed crinkly biramous hairs, at maturity mostly subglabrate. Leaves alternate, thick, glandular pitted, the basal ones ca. 10-15, crowded, 2-5 cm long, the base thin, clasping, ca. 4 mm wide, the petiole exceeding the blade, strap-shaped, ca. 1 mm wide, the blade 1-2 cm wide, biternately divided or some pedately or pinnately and then ternately divided, the segments linear or oblong, obtuse, 1-1 ½ mm wide. Floral stems terminal, nodding at first, slender, 1-2 dm tall, low ridged, with 10-15 linear leaves ca. 1 mm wide, the lower 1-2 cm long, ternately divided near apex, the upper shorter and entire. Heads whitish, solitary or with 1-2 smaller ones crowded below or with a few additional small ones scattered in upper axils. Involucre hemispheric, 4-6 mm high, 4-8 mm wide (to 10 mm wide pressed), the bracts 13-25, in about 3 nearly equal series, elliptic, acute to rounded, 4-6 mm long, 1 ½-3 mm wide, the midpart stiff coriaceous below, in all but the innermost thick and green and somewhat glandular above, the broad margins scarious, purplish, erose, pilose-ciliate in lower half, the inner narrower. Receptacle conoidal, naked, 1 ½-3 mm high and thick. Pistillate marginal florets 6-15; corolla ca. 2 ½ mm long, tubular, nearly regular, with 4 triangular teeth; style branches ca. 0.6 mm long, well exerted. Perfect disk florets ca. 40-



Figure 15. Type specimen of *Tanacetum bajacalifornicum* (15613), from the high Sierra San Pedro Mártir, x 0.25.

150; corolla ca. 3 mm long, the tube equalling the conspicuously widened throat plus the 5 triangular teeth; style branches 0.6 mm long. Pappus none. Mature achenes not seen.

Type collection. — Common, mostly in rock crevices, north slope of Cerro “2828” at 2800 meters elevation, Sierra San Pedro Mártir, Baja California, Mexico (near 31°02’N, 115°27’W), 14 September 1968, *Moran 15613* — holotype: SD 69075; isotypes: K, MEXU, UC, US, etc.

Distribution. — On rocks and cliffs near the east rim of the Sierra San Pedro Mártir, at 2500 to 2800 meters elevation. Other collections: rock crevices of S summit ridge, Cerro Venado Blanco, 2750 m, 15637; on rocks under pines and firs, E slope above Arroyo Copal, 2500 m, 15521; rock crevices on E slope of Cerro “2828”, 2800 m, 15411.

Discussion. — *Tanacetum bajacalifornicum* belongs to the *Sphaeromeria* group, characterized in part by the lack of rays in the pistillate marginal flowers and by the presence of malpighiaceous hairs. This group is centered in the Great Basin, and *T. bajacalifornicum* is isolated some 375 miles south of the nearest other member. The other caespitose members of the group have silvery canescent rather than sparsely pubescent herbage; and they differ from *T. bajacalifornicum* further as follows (cf. Rydberg, 1916). In *T. capitatum* (Nutt.) T. & G., ranging from Montana to Utah, which is most similar in leaf form, the heads are smaller and more crowded, with fewer involucre bracts and with far fewer and slightly

smaller florets. In *T. compactum* Hall, of the Charleston Mountains, Nevada, the plant is smaller, the lower leaves are flabellately 5-parted into 3-lobed divisions and the upper pinatisect, and a pappus is fairly well developed. In *T. potentilloides* A. Gray, ranging from Oregon and Idaho to Nevada and eastern California, the leaves are pinnately to tripinnately divided, the involucre bracts fewer, the receptacles white-hairy, and the florets smaller. In *T. nuttallii* T. & G., ranging from Montana to Nevada, the leaves are cuneate and entire or 3-5-lobed at the summit, the involucre bracts shorter and fewer, and the florets smaller. In *T. simplex* Nels., of Wyoming, the leaves are entire or bifid or trifid at the apex, the floral stems shorter, and the heads solitary.

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Department of Botany, Natural History Museum, P.O. Box 1390, San Diego, California, 92112